



Natural Resources Conservation Service
CONSERVATION PRACTICE STANDARD
RESTORATION OF RARE OR DECLINING NATURAL COMMUNITIES
CODE 643
(ac)

DEFINITION

Re-establishment of abiotic (physical and chemical) and biotic (biological) conditions necessary to support rare or declining natural assemblages of native plants and animals.

PURPOSE

This practice is used to accomplish the following purpose:

- Restore the physical conditions and/or unique plant community on sites that partially support, or once supported, a rare or declining natural community

CONDITIONS WHERE PRACTICE APPLIES

This practice can be applied on all degraded lands, including aquatic, terrestrial, or wetland sites, which historically supported a rare or declining native plant or animal community. The practice can also be applied to efforts to restore natural communities of local cultural importance.

Declining habitats identified herein are those referenced for Minnesota as critically endangered, endangered or threatened ecosystems (Figure 1). These declining habitats and the locations where they can be restored are:

- **Tallgrass Prairie**– areas that once supported prairie communities.
- **Oak Savanna**– areas that once supported savannas. Savannas typically occurred on prairie and transition soils.
- **Red Pine, Jack Pine and White Pine Forests** – areas that once supported native stands of red pine, jack pine and white pine.

The MN DNR Field Guides to Native Plant Communities will be used to further refine where it is appropriate to apply this practice.

This practice does not apply where it is possible to meet target conditions solely through implementation of a single annual management action, such as prescribed burning, prescribed grazing, forest stand improvement, or integrated pest management.

CRITERIA

General Criteria Applicable to All Purposes

Conduct a site assessment to determine baseline abiotic (nonliving, physical, and/or chemical components of the site) and biotic conditions (living characteristic, including native plants, wildlife, insects,

and other organisms important to reaching the target conditions), and to identify restoration objectives for the abiotic and biotic target conditions.

Use reference sites, ecological site descriptions, or other appropriate references to determine appropriate target conditions and degree of restoration required.

Identify (i) the natural disturbance regime(s) that created the target conditions, and (ii) the ecological processes necessary to maintain such conditions.

Identify invasive and exotic species that may have contributed to the degraded conditions, and that may challenge restoration efforts.

When restoring abiotic conditions, the following criteria apply:

- Restore macro and/or microtopography where required to support natural communities. Microtopography features are elevational changes at the individual plant scale, often removed by normal agricultural practices (i.e., plowing, subsoiling, and mowing), overgrazing by livestock and feral ungulates, and the resulting sheet and rill erosion.
- Macro topography features are elevational changes large enough to affect the plant community in a portion of the area that creates clumped vegetative mosaics, and are too large to remove with typical cultivation activities.
- Restore inherent and often diverse soil textures and/or chemistry (i.e. fertility, pH, and salinity) that supported the target natural community, when it has been altered through mixing, cultivation, irrigation, and/or land clearing and is required to support the natural vegetative pattern, structure, richness and diversity.
- Restore the substrate (i.e., oyster shell beds, coarse woody debris, and rock outcrops) where required to support natural communities.
- Restore hydrology where necessary to support plant or animal communities.
- Restore other degraded abiotic conditions, where required to support natural communities.
- Borrow material used in the restoration effort, will be free of noxious and/or invasive species.
- When restoration involves use of heavy equipment (tractors, dozers, etc.) for excavation, building of dikes or berms, installation of rock or wood structural elements, geomorphic modification, or redirection of flow regimes, plan in conjunction with the appropriate NRCS engineering National Conservation Practice(s).

When restoring a vegetative community, the following criteria will be met:

- Reconstruct biotic target conditions within the practice life span.
- Remove or control undesirable plant species that may jeopardize meeting success criteria.
- Use source-identified local ecotypes, when available.
- Establish vegetation in a manner that reflects the natural pattern (random or clumped mosaic, or uniform distribution) based on topography, slope, aspect, soils, and moisture gradients.
- Apply appropriate protocols for vegetative establishment (planting dates, planting methods, cold storage, plant material care, germination rates, post-planting management, etc.) to ensure an acceptable rate of survival of planted materials.

ADDITIONAL CRITERIA FOR TALLGRASS PRAIRIE RESTORATION

Protection of Existing Native Prairies

DNR identified remnant prairie communities will be protected from non-local sources of seed unless concurred with by the owner.

Varieties/cultivars (selected germplasms) of native species will not be used adjacent to existing remnant prairies in an effort to limit genetic influences. A minimum isolation distance of ¼ mile is required.

Seed Origin

Seed must come from local sources when planting buffers adjacent to identified remnant prairies. The following is a recommended sequence for obtaining seed/plants:

- Collected directly from the adjacent remnant prairie.
- Collected from a local remnant prairie within the same ecological sub-section.
- Collected from a remnant prairie within the same ecological section.

Restoration on Agricultural Fields and Other Disturbed Sites

High species diversity is recommended to promote native community stability and function, to provide benefits to multiple wildlife species and to prevent establishment of invasive species.

Native prairie plant communities will be established utilizing seed harvested from existing Minnesota native prairies, or utilizing seed mixes comprised of Minnesota ecotype grasses, legumes and forbs, developed to reflect “native prairie” communities as determined suitable for specific site conditions.

Seeding Requirements

It is desirable for seed sources of native grass, forbs and legumes to originate from as close to the planting site as possible. When available, “Yellow Tag” or source identified materials are preferred.

Refer to [Agronomy Technical Note #31](#) – “Herbaceous Vegetation Establishment Guide” for seeding specifications and a listing of grass varieties/natural germplasm materials and their zone of adaptability

ADDITIONAL CRITERIA FOR OAK SAVANNA RESTORATION

Prior to European settlement, oak savanna was common in a long narrow diagonal zone northwest to southeast across Minnesota as identified in Figure 1.

This community is characterized by widely spaced, open grown trees/shrubs and greater than 30% prairie grassland understory. The canopy cover is broken to scattered and ranges from 10% to as high as 70%.

Restoration Design

50%-75% of the site shall be established to native prairie according to the practice specifications for “Tallgrass Prairie Restoration”. 25%-50% of the site shall be established to native oak trees and native shrubs.

- Planting stock for oak savanna establishment shall consist of Minnesota ecotype species: Bur Oak (*Quercus macrocarpa*), White Oak (*Quercus alba*), Black Oak (*Quercus velutina*), Swamp White Oak (*Quercus bicolor*) or Northern Pin Oak (*Quercus ellipsoidalis*) adapted to the site conditions and savanna type planned.
- Select native shrubs adapted to the site conditions. Refer to practice standard 645-Upland Wildlife Habitat Management. Predominant savanna shrub species include: Plum (*Prunus spp*), Dogwood (*Cornus spp*), Rose (*Rosa spp*) and American Hazel (*Corylus americana*).
- Minnesota ecotype seedlings developed to reflect native communities and obtained through commercial vendors and determined suitable for specific site conditions may also be used.

Planting Rate

- Trees and shrubs will be planted at a rate of 100-125 trees/shrubs per acre. On wetter sites, up to 250 trees/shrubs per acre may be planted if recommended by the MDNR Forester.
- Woody plantings shall consist of 80%-100% oaks with the balance comprising native shrubs.

Planting Size

- For restorations less than 10.0 acres in size, the tree/shrub planting shall be in the form of clumps, not plantations, and shall be planted at a rate of 25 trees/shrubs per clump. Distribute the clumps throughout the project area.

- For restorations greater than 10.0 acres in size, the tree/shrub planting shall be in the form of blocks. Each block will not exceed 5.0 acres, and will be distributed throughout the project area.

Shrubs as applicable shall be randomly intermixed with the oaks.

Refer to Conservation Practice Standard 612 – Tree/Shrub Planting Specification for site preparation, planting dates and weed control specifications.

Management

Oak savannas are plant communities that developed and are maintained by fire. General guidance for management of the understory component is as follows:

- To produce barrens understory structure of grasses without brush, utilize late spring and summer burns. Frequent “low intensity” burning techniques are necessary such as the “backfire” method on a 1-3 year interval.
- To produce scrub barrens with a sparse brush and grass understory, high intensity fires at intervals of 5 years or greater are necessary.

Avoid burning the savanna portion that contains trees and shrubs until they reach a size resistant to fire, usually a minimum of 5 years following establishment.

ADDITIONAL CRITERIA FOR RED PINE AND WHITE PINE RESTORATION

Apply this practice to sites where the soils and climate are suitable for growing red pine (*Pinus resinosa*), and white pine (*Pinus strobus*).

Do not apply this practice to convert native pine stands to red or white pine stands. Sites should be located within the historic range as identified in Figure 1.

Restoration Design:

- Each planting site shall contain a mixture of primary and secondary species as follows:
 1. Primary Species: red pine and white pine.
 2. Secondary Species: three native hardwood tree species and one native shrub species suited to the eco-region and site conditions.

Note: where desired, an understory native conifer may be substituted for one of the hardwood species.

- Where practical, the planting patterns should be altered to reflect the random nature of a natural forest stand. Rows of single species should be avoided.
- Retain any appropriate existing native vegetation.
- Planting stock shall consist of Minnesota ecotype red pine, jack pine and white pine, from known and documented seed sources.
- Planting stock for native hardwood trees and shrubs will be adapted to the site conditions.
- The potential for animal depredation of planted trees and shrubs should be considered, and appropriate steps taken to protector manage damage (e.g. bud caps, tree shelters etc.)

Planting Rate

Plantings should establish 300 to 500 red and white pines per acre, up to 800 jack pines, and 100 to 300 hardwood trees and shrubs per acre.

Refer to Conservation Practice 612 – Tree/Shrub Planting Specification for site preparation, planting dates and weed control specifications.

ADDITIONAL CRITERIA FOR JACK PINE WOODLAND RESTORATION

Jack pine woodlands are a declining plant community that occurs in central and northern Minnesota. They typically occur on sandy soils where crown and surface fires were historically common. Their canopies are patchy to continuous (25-100% cover), dominated by jack pine with minor amounts of paper birch, red pine, quaking aspen and bur oak. Hazel and Juneberry are common shrubs.

Sites should be located within the historic range as identified in Figure 1.

Planting Rate

Plantings should establish 100 to 400 jack pines per acre, and up to 100-300 hardwood trees and shrubs per acre. A sparse planting of native grasses and forbs may be included in the restoration site.

Refer to Conservation Practice 612 – Tree/Shrub Planting Specification for site preparation, planting dates and weed control specifications.

CONSIDERATIONS

Land use and habitat in the surrounding landscape may influence the ability to achieve restoration and management objectives.

Engage interdisciplinary expertise (e.g., engineers, hydrologists) early in the planning process to consider relevant watershed factors, geomorphic setting, and risks to infrastructure or property when determining appropriateness of planned restoration activities.

Engage cultural experts and leaders acquainted with the cultural importance local fauna, flora, and customs in the planning process.

Implement Integrated Pest Management practices to mitigate for potential on-site and off-site impacts.

Identify and conserve adjacent habitat to sustain disturbance-intolerant wildlife during the restoration activities. In the absence of such refuge, stage restoration over time to provide such habitat.

Soil mycorrhiza can have a significant impact on the establishment and pattern success of restoration efforts of native plant communities. Consider existing mycorrhiza populations and the use of inoculation to mitigation for deficiencies.

Residual pesticides and excessive soil fertility can reduce restoration success. Consider the use of a nurse crop reduce pesticide and fertility levels. Locally harvested native hay can served a dual purpose, as a weed barrier and seed source for native species that are not commercially available.

Maintain the integrity of the local genotypes by using local plant materials (e.g., use of local seedbank, harvest of plant materials from local native areas) and/or using strict quality control standards when using commercial plant materials.

Implement standard biosecurity measures to minimize contamination of the native seed bank from seed and soil attached to vehicles, equipment, and clothing.

Reintroduce, establish or manage native biota (e.g., beaver, prairie dogs, oysters, and tussock sedges) to assist in the restoration and/or maintenance of the target conditions.

Avoid implementing restoration and/or maintenance activities during critical life stages of sensitive fish and wildlife, except when necessary to achieve the desired habitat condition, including desired disturbance regimes.

PLANS AND SPECIFICATIONS

The restoration plan and specifications shall:

- Document baseline conditions (abiotic and biotic).
- Describe the target abiotic (e.g., soils/substrate, hydrology, macro and micro topography, aspect) and biotic (e.g., species composition, age, structure) conditions.
- List each restoration activity, including activities that are supporting conservation practices (e.g., burn, restore historic microtopography, fertilize, seed bed preparation, and planting) with a date range for implementation/application of each activity.
- Include facilitating practices (prescribed burning, forest stand improvement, etc.) necessary for restoration, including the anticipated timing, extent, intensity, and frequency of each disturbance/management activity identified as needed to create the target conditions.
- Include activities needed to control noxious, invasive, undesirable, and/or competing plant or animal species to restore the site to the target conditions.
- Include supporting practices (e.g. filter strips, buffers, integrated pest management) that reduce adverse impacts from the restoration activities on adjacent habitats, including aquatic resources.
- Describe of the assessment or monitoring process that will be used to determine when restoration has been successful.

OPERATION AND MAINTENANCE

The O&M plan shall:

- List activities required to maintain the restored conditions in the Operation and Maintenance (O&M) plan.
- Include a post-restoration schedule that provides for the identification of adaptive management efforts as necessary. Include an assessment of the potential for reinvasion by noxious, invasive, and problem species from nearby lands and waters in the assessment.

REFERENCES

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